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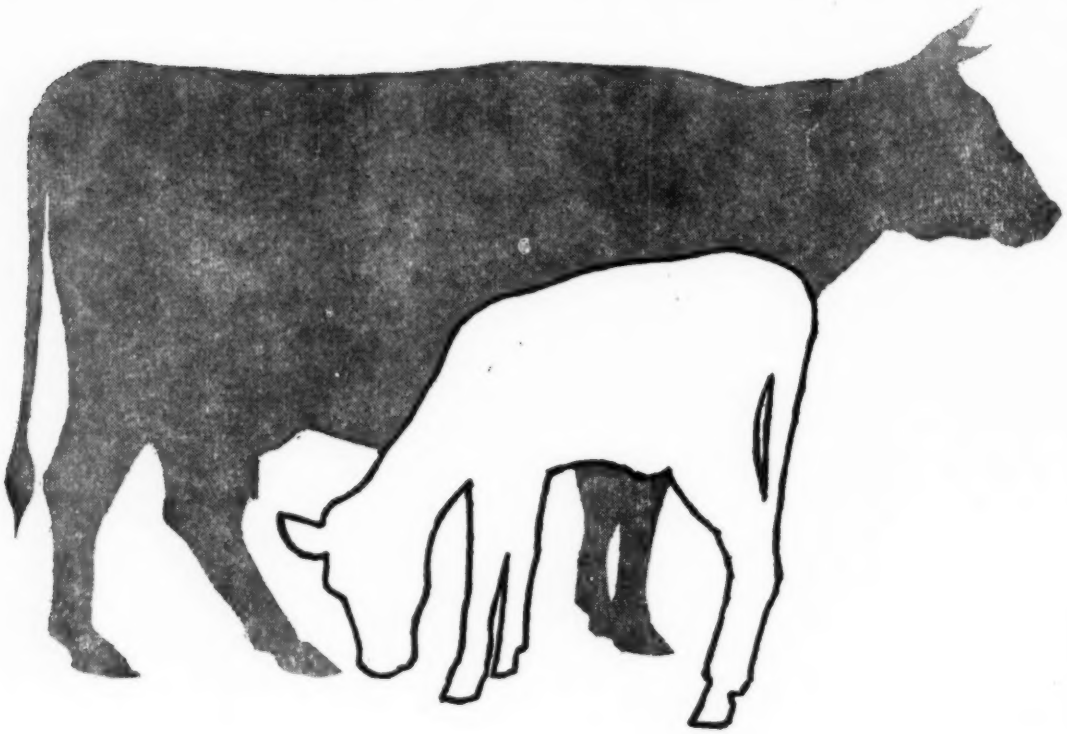

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Adenocarcinoma of the Maxillary Nasal Sinus in the Dog

BY

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University of Bristol, Langford***

Introduction

ALTHOUGH the occurrence of adenocarcinomata arising from the mucin glands of the nasal sinuses is well recognised in man, few reports have been published of the condition occurring in the dog.

Two such cases have been referred to this department, the report of which would seem to be worthwhile, particularly from the point of view of the differential diagnosis of nasal obstruction in the dog.

Reference to the literature shows that this particular tumour syndrome has only been reported once before by Berkelhammer (1949), although in this case the tumour appeared to produce a much greater general systemic effect than in the cases reported below. Troy (1947) reports an adenocarcinoma arising in the frontal sinus, but the ensuing syndrome seems to have been due to invasion of brain tissue and does not present a picture similar to that seen by the author. On the other hand, Girod (1933), in his thesis from Lyons on the nasal tumours of domestic animals, claims that carcinomas occur in the dog, developing chiefly in the region of the ethmoid sinus.

Case Histories

Case 1. Curly-coated Retriever, 8 years old.

Five weeks prior to the consultation the dog began to produce a stertorous sound when breathing through the nostrils, rather suggestive to the owner of partial obstruction of the nasal passages. After 2 weeks the development of a clear mucous discharge, later becoming tinged with blood, was seen; subsequent to this there was little change except for the appearance of a slight lachrymal discharge from the left eye.

When seen, the animal appeared to be quite normal with the exception of a unilateral nasal and lachrymal discharge accompanied by sonorous breathing. There was no superficial facial swelling.

The animal was anaesthetised with thiopentone sodium and the left nasal passage examined. No obvious obstruction was detectable. An effort was made to pass a probe into the left lachrymal duct *via* the dorsal punctum but the duct appeared to be blocked at a distance of $\frac{3}{4}$" from this point. Radiographs of the head in the A/P position (Fig. 1) showed a uniform increase in density of the nasal fossa on the left side of the face. It was decided to trephine the maxillary sinus, and biopsy material was taken from the naso-turbinate bones.

Histological examination (H. & E.) showed that this was an adenocarcinoma probably orginating from the mucin glands situated in the epithelial lining of the sinus. The tumour appeared to consist of a fine stroma within which lay masses of epithelial cells. Some attempt at acini formation could be seen but mitoses were common. Many of the cells, when stained with P.A.S., could be seen to contain small globules of mucin. As a result of this biopsy finding the dog was destroyed.

At autopsy small metastatic deposits were found in the submaxillary nodes only. On section of the nasal region, the tumour could be seen (Fig. 2) filling the left nasal fossa with dorsal spread across the nasal septum. The tumour also appeared to be infiltrating posteriorly in the periorbital region.

Case 2. Cocker spaniel, 9 years old

This case was presented with a history of snuffling and unilateral bloody nasal discharge over the past 3 months. The respiratory obstruction had become progressively more marked over the past 4 weeks

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and the owner insisted that the dog be destroyed.

Autopsy, following section of the nasal region immediately behind the infraorbital foramen, showed the right nasal fossa to be filled with a tumour mass which, on histological examination, proved to be an adenocarcinoma. No metastases were found in the lymph nodes of the head region.

Both heads were macerated. Following this it could be seen that in Case 1 extensive infiltration of the bone tissues had occurred, completely destroying the turbinate bones on the affected side together with part of the nasal septum. Extensive periorbital destruction and rarefaction had also taken place (Fig. 3a and b) involving the maxillary, frontal and zygomatic bones.

The skull of Case 2 showed almost complete absence of the turbinates and most of the ventral maxilla and palatine bones on the affected side (Fig. 4). The beginnings of periorbital bone destruction could also be seen, affecting the maxilla and frontal bone along the supra-orbital ridge.

Discussion

It appears from these findings that adenocarcinomata of the maxillary nasal sinus epithelium tend to be locally malignant producing their pathological effects by local tissue destruction rather than by the presence of multiple metastases. This picture is very similar to that seen in man (Willis, 1953).

Little or no superficial swelling of the face was seen in spite of the effect on both hard and soft tissues, although it appeared in both cases that the lumen of lachrymal duct was obliterated by local pressure, or by invasion of tumour cells, producing an overflow from the conjunctival sac. Unilateral epistaxis would seem to be a constant feature at some stage of the process. A third case showing only persistent epistaxis but producing a similar X-ray picture to Fig. 1 has also been seen recently, but this is at the moment unconfirmed owing to the unwillingness of the owner to have the dog destroyed.

The obstruction to the passage of air produced in the later stages is the result of the blockage of the nasal passage by the growing tumour mass. Clinically, this condition must be differentiated from other conditions presenting a similar picture. These include the presence of a nasal polyp or foreign body, pus in the sinuses as a result of chronic infection, or abscess formation on the nasal septum.

Acknowledgments.—Thanks are due to Professor A. Messervy, for permission to publish this article, to Mr. N. St. G. Hyslop, and Mr. A. D. Osborne, for help with the preparation and examination of the histological sections, and to Mr. M. Parsons for the radiograph and excellent photographs.

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A Case of Dystocia and Caesarean Section in Chinchilla lanigera

BY

G. B. VOWLES

Frome, Somerset

Introduction

CHINCHILLA lanigera are now being bred in this country in considerable and increasing numbers. The resulting increase in demand for veterinary attention for these animals has encouraged the author to describe in some detail a single case of dystocia and caesarean section.

Subject :

Female Chinchilla lanigera. Born August 27th, 1957.

History :

Mated February 18th, 1959, and due to litter June 8th.

Weighed :

February	18th	1959	— 19¼	oz.
March	1st	,,	— 19½	,,
,,	15th	,,	— 21	,,
April	26th	,,	— 22	,,
May	10th	,,	— 23½	,,
,,	25th	,,	— 23½	,,

When purchased by the present owner the animal was 14 months old and considered to be a good example of the species.

The general health of the subject was good throughout gestation, except for a short period during which it suffered from fur fungus, but as will be seen from the above figures, the weight gain was steadily progressive. On June 8th, when parturition was due, the animal showed the normal signs of a wet nose and front, but was described by the owner as having been in a state of collapse. It was not then known if labour had started. On June 9th, it seems that labour did start, and continued intermittently until June 11th. The foetal fluids were then pale pink in colour.

Symptoms :

At 3.30 p.m. on June 11th, there were signs of intermittent labour, but abdominal palpation revealed no movement in the three foetuses present. The animal showed extreme lassitude, toxicity and was not eating. It was assumed, owing to protracted labour, that there was no possibility of any foetuses being alive. No vaginal examination was made and 0·1 c.c. pituitrin was given intramuscularly.

Following the advice of Brown & Morgan (1959) it was decided to make a cautious digital vaginal examination at 5.15 p.m. This indicated a foetus lying transversely, but the exact presentation could not be accurately determined.

Diagnosis :

Transverse presentation of an over-sized foetus.

After discussion with the owner it was decided that a caesarean section should be performed.

FIG. 1.—Uniform density increase in region of left maxillary sinus.

FIG. 2.—Tumour mass filling left nasal fossa.

FIG. 3a.—Periorbital bone destruction.

FIG. 3b.

FIG. 4.—Partial destruction of maxillary and palatine bones.

No reference could be found to the technique of performing the operation in this species, and the advice of D. H. W. Brown was sought. The operation was carried out as follows:

Anaesthesia:

After premedication with 1/1000th gr. atropine subcutaneously, anaesthesia was induced using the B.O.C. oxygen ether apparatus, with the Hall's mask adaptation for small animals. In order to prevent undue excitement, the method of induction employed was to pass the ether mixture into the cage, which was covered with a blanket, until a stage of deep narcosis had been reached. Surgical anaesthesia was obtained by removing the animal from the cage and closely applying the mask.

There was a complete absence of salivation, and surgical anaesthesia was maintained for 55 minutes without difficulty. Induction was complete in 10 minutes, and recovery from the anaesthetic was almost equally undelayed.

Operation

After preparation of the site including shaving, a midline incision 2 inches in length was made, commencing just anterior to the pelvic brim. The uterus was located without difficulty immediately under the incision. At this stage it was noted with some surprise that there were movements of the foetus. The uterus, which could not be raised without enlarging the abdominal incision, was incised *in situ* after careful packing. The incision revealed the first foetus in a transverse position mainly in the left horn. This foetus and membranes were delivered after lengthening the uterine incision, this being necessary because of the extremely friable nature of the tissues. The second foetus was located in the right horn of the uterus and delivered through the same incision complete with membranes.

The third foetus, 2·5 cm. in length, was mummified. It was delivered by the same route.

The uterine incision was closed with a continuous suture of No. 00 chromic catgut, and 50,000 units aqueous penicillin were sprayed in the peritoneal cavity. The muscle and peritoneal layers of the abdomen were closed. Similarly interrupted mattress sutures of No. 3 fine purple nylon were used for the skin.

The first foetus died shortly after delivery. The second lived and appeared quite normal. The parent animal recovered rapidly from the anaesthetic and was sent home with the live foetus after an injection of 50,000 units penicillin intramuscularly.

Sequelae

On June 12th the subject was dull and neither eating nor drinking. A further injection of 50,000 units of penicillin was given intramuscularly. The young one, however, was lively and appeared to be suckling successfully.

On June 13th, the subject was lively, curling its tail and twitching its whiskers. A little hay, green food and fluid were taken. A further examination was made on June 14th in answer to an urgent call from the owner when the animal was found to have an intussusception with 2·5 cm. of intestine prolapsed. Manual reduction was unsuccessful, and although the prognosis was considered very unfavourable laparotomy was undertaken. It was interesting to note that the animal showed no signs of abdominal pain.

An abdominal incision almost 5 cm. in length, parallel to, and 0·5 cm. from, the previous incision was made, and the intussusception was reduced. The muscle and skin layers were sutured separately as previously described.

The animal made a slow recovery until a week following when, after a dust bath, it showed symptoms of exhaustion and abdominal pain, and died within the hour.

A *post mortem* revealed another intussusception in the small intestine. The laparotomy incisions had healed by first intention.

The foetus produced alive by the operation had to be artificially fed from June 15th and died 2 days later with symptoms of enteritis.

Although no firm conclusions can be drawn from one case it seems evident that the use of a routine anaesthetic and surgical technique in chinchilla presents less difficulty than the general management of the animal in its recovery period and afterwards.

The susceptibility of chinchilla to intussusception is widely known and the urgent task before the profession would appear to be the elucidation of its cause and the means of its prevention.

Acknowledgements.—I wish to thank Mr. T. K. Stephens and Mr. D. H. W. Brown, and also Messrs. B. M. Mills, G. N. Benbow and M. Oxenham for their invaluable help and advice.

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UNIVERSITY NEWS

Cambridge

The Wellcome Foundation Prize (consisting of £20 in books) presented by the Wellcome Foundation, for the best student in Animal Pathology in 1959, has been awarded to Miss M. Rozenblum, of Newnham College.

The Allen and Hanbury Prize in Veterinary Parasitology (consisting of £20 in books) presented by Messrs. Allen and Hanbury Ltd., for the best work in Veterinary Parasitology in 1959, has been awarded to Mr. J. D. Temple, of Queens' College.

First Part of the Veterinary Examination

Passed in all sections:—

D. C. Anderson, B.A.	Queens'
R. E. W. Halliwell, B.A.	Gonville and Caius
J. K. Henwood, B.A.	Jesus
Miss M. Rozenblum, B.A.	Newnham
J. D. Temple, B.A.	Queens'

K. M. T. Brown, B.A. (Jesus), and K. M. Butt, B.A. (Sidney Sussex) passed in two sections only.

Abortions in Heifers which had been Fed Silage Containing Hexoestrol

BY

J. E. F. RANKIN

Veterinary Research Division, Ministry of Agriculture for Northern Ireland, Stormont, Belfast

SUMMARY.—An account is given of a series of abortions in heifers with evidence to indicate that the agent responsible was hexoestrol with which their silage ration had become contaminated. Tests for the usual infectious causes of abortion proved negative. The contamination of silage resulted from sealing the silo pit with manure from hexoestrol-fed bullocks. The hexoestrol persisted in the manure for a period of between 9 and 12 months.

Introduction

THE synthetic oestrogens have been used extensively to promote improved live-weight gains in bullocks towards the end of the fattening period and there is ample evidence to show that the hormones do, in fact, help in this respect (Aitken & Crichton, 1956; Lamming, 1957; Dodsworth, 1957). However, it is also recognised that in addition to producing more meat there are also produced some undesirable side effects in the treated animals. Crichton (1957) states that hexoestrol will not produce rapid weight increase without at the same time producing marked side effects. Preston, Gee and Crichton (1957) describe the side effects as being coarseness of neck, signs of restlessness, pawing of the ground, slackening of pelvic ligaments and raising of the root of the tail. The development of mammary tissue and teats is a constantly described consequence of hexoestrol treatment in virgin heifers, and in bullocks also (Smith, 1958). Jordan (1953) noted that some groups of lambs undergoing oestrogenic treatment suffered serious losses due to rectal and vaginal prolapse.

Perhaps most of these side effects are not of great importance in cattle which are destined for slaughter, but many of the effects would be serious in breeding animals. Manufacturers of oestrogenic materials for implanting and for incorporation into feedingstuffs are generally careful to point out that breeding stock must not be exposed to the treated food or to the implants. A joint announcement by the Agricultural Research Council, the Ministry of Agriculture, and other research units (1959) emphasises the danger of deliberately exposing breeding stock to the oestrogenic material, but expresses the opinion that there is virtually no danger to other stock. The statement further points out that the risk of contaminating pasture by animals excreting synthetic oestrogens is one which must be borne in mind although present indications are that the risk is not a serious one.

An account is given here of the consequences which followed the feeding to 7 pregnant heifers during late 1958 and early 1959 of silage which had become contaminated by excreted hexoestrol.

Case History

The herdowner had used hexoestrol-impregnated cubes with home-mixed fattening meal in order to feed 15 bullocks between December 1957 and June 1958. During this period these bullocks consumed 2 tons of the cubes, every 3 lb. of which contained 10 mg. hexoestrol. The earlier-fattened beasts were sent for slaughter in March and April, and the last went early in June. All were kept in one house during the feeding period, bedded with straw, and the entire excreta was, therefore, contained in this house. Hexoestrol was not fed to any other animal on the farm. It was intended that the manure from the house should be spread over the grazing, but grass silage-making operations at that time proceeded rapidly and the covered pit-silo became full and ready to be sealed. The silo was convenient to the bullock house and the owner decided that time and labour would be saved by using the litter from this house to seal the pit. He had been told it was safe to spread the litter on pasture and he saw no reason why it should not be used to top the silo. This was carried out in July 1958.

The silo was opened for use on December 1st, 1958, and was fed to the 7 pregnant heifers which were due to calve during April 1959. It was fed also to some yearling animals of both sexes. It is estimated that the pregnant heifers each consumed an average of 40 lb. of the silage per day from December 1st, 1958 until the first week in April 1959, when the owner was advised to stop using it. The yearling stock consumed not more than 20 lb. each day, possibly rather less than this amount.

The total amount of hexoestrol consumed by the bullocks in the first half of 1958 was about 15 g., and as only about 10 per cent. is absorbed it is reasonable to assume that 13.5 g. was passed into the litter and subsequently put on top of the silage. If most of the oestrogen diffused into the silage from the sealing material then each heifer had the opportunity to take up a total amount of the drug estimated at between 0.5 and 1.0 g. and the yearling stock had access to rather less than half of this amount per head. In fact, hexoestrol was identified chemically both in the manure and top layers of the silage, but it is impossible to give an exact assessment of the amount ingested from the silage.

The owner first observed udder development in the pregnant heifers early in January (*i.e.* 5 or 6 weeks after the commencement of silage feeding) and the first heifer to abort did so later that month. The foetal development indicated a pregnancy of between 6 and 7 months. Four more heifers aborted during February and March, the last foetus being of about 8½ months' development. The sixth heifer calved

a full-term calf early in April but she had made preparations for the event many weeks earlier in the form of slack pelvic ligaments, enlargement of vulva and formation of an udder. The seventh animal calved a normal calf with only normal preparation. Tests on samples taken from all the heifers on April 1st and April 7th excluded the usual bacterial causes of abortions.

Symptoms

Clinical examination of the animals showed clearly the udder development noticed previously by the owner. The teats were all very large and "cow-like" despite the fact that they had not been milked. The vulvae were enlarged and slack, the vulval openings being abnormally patent. The whole perineum gave a drooping appearance and the pelvic ligaments were slack, with the root of the tail raised. One heifer which aborted in March suffered a prolapse of the uterus immediately afterwards and required surgical treatment.

In the group of yearlings there were 7 heifers, 5 of which showed the formation of long teats and small spongy udders. One subsequently produced a small quantity of milk and was suckled by a bullock in the same group.

The signs here mentioned are consistent with what might be expected in stock which had been exposed to excessive amounts of oestrogen. In Australia the oestrogen-like substances contained in subterranean clover were noted by Bennetts, Underwood and Schier (1946) to cause dystocia and prolapse in sheep. Pope (1954) in a review of the subject of pasture plant oestrogens, notes the occurrence of dystocia and prolapse, and also that unbred ewes developed udders and came into milk. Bennetts and Underwood (1951) state that general relaxation of pelvic ligaments with elevation of the root of the tail is typical of excessive oestrogen stimulation.

It is interesting to note that in the heifers being reported upon here, there does not appear to have been produced any permanent breeding disability. Six of the 7 were successfully settled in calf during July 1959. The seventh one—the animal which suffered the prolapse—has not been served due to her poor condition and to the endometritis which arose out of the prolapse and its correction.

Laboratory Tests

In an attempt to prove that the silage was, in fact, the agent responsible, samples of it were taken for feeding trials using young, unbred female guinea-pigs. Four groups of 4 guinea-pigs were used:—

Group 1 was fed silage from the lower parts of the pit, plus grass-free pellets. About 200 g. silage was consumed per day by the group.

Group 2 was fed silage from the top of the pit, plus grass-free pellets. About 200 g. per day was consumed by this group also.

Group 3 received 10 microgrammes stilboestrol subcutaneously on 2 occasions at 7-day intervals. The feeding of the group consisted of hay and pellets free from grass.

Group 4 was fed only on hay and grass-free pellets.

The guinea-pigs were maintained on their diets for 14 days, after which time they were killed and the uteri and ovaries examined histologically. It was intended that the trial should continue longer than this but the guinea-pigs on the silage diets did not maintain weight and bodily condition and in consequence it was thought advisable to terminate the experiment. One guinea-pig in group 2 died on the 12th day.

Results

Group 1 The uteri failed to show any macroscopic differences from those in Group 4 (controls). Microscopically, however, there was some oedema in the uterine walls and there was a tendency towards stratification of the epithelium of the lumina.

Group 2 In this group all the uteri were markedly flushed when removed from the guinea-pigs and showed evidence of considerable vascular activity. Microscopically the bodies of the uteri were swollen and oedematous with very marked hyperaemia. The epithelium of the lumen of each showed stratification or the formation of cuboidal cells preparatory to stratification. Increased glandular formation was noted also. The ovaries from this group were hyperaemic with many developing ova.

Group 3 Here there was marked enlargement of the uteri but less marked hyperaemia than was noted in the Group 2 animals. The organs were soft and oedematous. Microscopically the uterine walls showed only a little hyperaemia with some stratification of the mucosa in 2. Large numbers of follicles were to be seen in the ovaries of this group as in those of Group 2.

Group 4 The controls in this group exhibited uteri which were pale, almost white in colour. Microscopically there was no evidence of stratification of luminal epithelium and the ovaries showed less follicular development than in other groups.

The changes noted in Group 2, and to a lesser extent in Group 1 are considered to be indicative of an intake of oestrogen which was not available to Group 4. They are considered similar to those mentioned by Pope (1954) and Bennetts *et al.* (1946), namely that the continuous administration of oestrogens to animals causes proliferation of uterine endothelium and the development of uterine glands which may lead in time to cystic glandular hyperplasia. This same effect is reported to have resulted from the feeding of guinea-pigs upon either extracts of dried subterranean clover (Curnow, Robinson & Underwood, 1948). Hexoestrol was identified chemically in the manure and in the topmost layer of the silage.

(*Continued at foot of col.* 1 *overleaf*)

A Note on the Use of the 9R Fowl Typhoid Vaccine in Poultry Breeding Flocks

BY

W. A. M. GORDON and D. LUKE

The Farm, Stormont

SUMMARY.—The value of the 9R vaccine in the control of fowl typhoid has been confirmed in Northern Ireland. Its use in adult birds in poultry breeding flocks is reported. In two such flocks blood agglutinins developed to the extent of 6.12 per cent. and 5.83 per cent. respectively.

The vaccinal strain was isolated 11 months after vaccination and there was presumptive evidence that vaccination of adult birds with the rough strain may induce pathological changes in the ovary in some birds.

As a result of the work of Williams Smith (1956) on the use of living attenuated vaccines a notable advance was made in the control of fowl typhoid. The value of such vaccines was confirmed by Harbourne (1957), and we ourselves have successfully used the 9R strain in outbreaks in commercial egg flocks.

The behaviour of the 9R strain when used in adult breeding birds has received comparatively little attention. Gordon, Garside, and Tucker (1959) have shown that the 9R strain was transmissible *via* the egg to the extent of 1.9 per cent. and this passage *via* the egg could continue for fairly long periods (31 weeks). These authors also considered that the rough strain showed no tendency to revert, and they reported that 2.4 per cent. of 208 birds vaccinated with the 9R vaccine developed agglutinins. All the birds used in their experiments were vaccinated at 4 to 8 weeks of age.

We have had an opportunity of using the 9R vaccine, as supplied by the Animal Health Trust in adult birds in breeding flocks, and of studying the subsequent blood test results, which was done under the Accredited Poultry Farm Scheme in Northern Ireland. We also have carried out bacteriological examinations of reactors from these flocks. The rapid whole blood test is used as the routine test in Northern Ireland (Gordon & Brander, 1952). When potential reactors of any kind are detected by the lay testing staff, tube samples from the suspect birds are sent to this laboratory and these are tube tested in dilutions of 1:10, 1:20, 1:40, and 1:80. The reacting birds are held in isolation on the farm for a period of 3 weeks and then a second tube sample of blood is sent here for examination. It is tested in the same dilutions as before. The serological status of the birds is assessed on the results of these two tests. This method of blood testing has been in operation for 2 years and so far the breeding results on tested farms have not called for any re-assessment of our criteria.

When birds are received for bacteriological examination routine culture of liver, gall-bladder, spleen, and ovary in Selenite F (Oxo Ltd.) is carried out. Particular attention is paid to any of these or to any other organ showing pathological changes.

The results on 3 of these breeding farms may be regarded as typical.

Farm No. 1

Fowl typhoid was diagnosed in a specimen submitted by the owner in June, 1958. The affected pen was disposed of and in August the remaining 250 adults on the farm were blood tested and all passed. These were vaccinated. On September 30th, 1958, the vaccinated birds were retested and 2 doubtful reactions occurred. Both of these were examined *post mortem*, one showed pathological changes in the ovary. No changes were seen in the other. In both cases bacteriolegical examination was negative.

Abortions in Heifers, etc.—*Concluded.*

Conclusion

There is evidence to show that hexoestrol found its way from the manure into the silage, particularly the upper layers, and it is presumed that it led directly to the abortions and the other symptoms seen in the heifers. Permanent infertility did not occur.

Acknowledgments.—I am indebted equally to Mr. J. R. Todd, B.SC., M.AGR., DIP.AGRIC.SCI., A.R.I.C., who carried out the chemical analyses and who assisted in the biological tests, and to Mr. J. T. Baxter, M.R.C.V.S., who carried out the histo-pathological procedures and who expressed valuable opinions upon the microscopical findings. I wish also to thank Messrs. P. S. McBride and J. A. Kinney, MS.R.C.V.S., who first brought this case to my notice. Professor H. G. Lamont, O.B.E., D.SC., M.R.C.V.S., kindly permitted publication of this paper.

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In June, 1959, a routine blood test was carried out on 178 birds, and 11 reactors were detected at the plate test. Immediately after the test 2 of these birds showing complete agglutination in 1 : 80 dilution were examined, and both had typical pathological changes in the ovary. The rough strain only of *Salmonella gallinarum* was isolated from the ovary. (The acriflavine test of Braun & Bonestell (1947) was used to test cultures for roughness.) This occurred about 10 months after vaccination. Of the 11 reactors at this June test 6 showed complete agglutination in 1 : 80, 2 were complete in 1 : 40, and in the remaining birds the reaction was classified as doubtful. The remaining 9 birds were received for *post-mortem* examination 5 weeks later, and in only 2 was the titre maintained at the 1 : 80 level, the others showing a decline in titre. In both the birds in which the titres were maintained, pathological changes were found in the ovary and the rough strain of *S. gallinarum* only was isolated. The other 7 birds were pathologically and bacteriologically negative.

Farm No. 2

Fowl typhoid was diagnosed in chicks from this source in the autumn of 1957. It was discovered on enquiry that an undiagnosed illness had occurred in one of the breeding pens in September of that year. The condition responded to a course of furazolidone without any deaths. On November 26th, 1957, 7 reactors were found in this pen, and in 6 of these cases a smooth culture of *S. gallinarum* was obtained on bacteriological examination. In 1958, 1,301 birds were blood tested and a reaction was found in 4; but *post-mortem* examination of 2 of these failed to establish any Salmonella infection. At this stage the owner decided to vaccinate part of the flock, and breeding operations during the 1958-9 season were apparently successful. At the routine blood test in 1959 a flock of 400 unvaccinated birds all passed the test; in a flock of 240 vaccinated birds 14 reactors appeared, and in a small flock of 88 of the same origin as the 240 flock, but which had not been vaccinated, all passed the test. Four of these reactors were examined and 3 showed pathological changes in the ovary. From 2 of these the rough strain of *S. gallinarum* was isolated. In addition, one other bird which died at this time and which gave a partial reaction at 1 : 10 dilution also showed ovarian changes and the rough strain was isolated from the ovary. These isolations were made about 11 months after vaccination.

Farm No. 3

This farm was visited by a fox in December, 1958, and subsequently a number of deaths occurred in the disturbed flocks. One specimen was submitted for examination, showed changes suggestive of fowl typhoid, and to the owner's surprise we isolated *S. gallinarum*. In the meantime about 20 sick birds had been isolated and were subsequently disposed of without being blood tested. All the remaining stock were then tested but no reactors were found. All the birds were vaccinated. On March 3rd, 1959, *S. gallinarum* was recovered from chicks hatched on this farm, and on March 10th, 1959, the supply flock was tested and 3 reactors were found. All showed pathological changes in the ovaries and the vaccinal strain was isolated from all 3. In addition a smooth strain was recovered from the ovary of one of these birds. On April 16th, 1959, 708 birds were tested and 3 reactors were found. One of these showed pathological changes in the ovary but bacteriological examination was negative. Subsequent tests detected 4 more reactors and in 2 of these changes were found in the ovaries. The rough strain was isolated from both. In July, 1959, 1,050 birds were tested and no reactors were found.

Discussion

Of the 28 birds which reacted to the blood test in the vaccinated flocks all showed extensive and typical pathological changes in the ovary. On 9 occasions the rough strain of *S. gallinarum* was isolated, and from 1 bird only did we recover a smooth strain of the organism. A noteworthy feature was the persistence of the vaccinal strain in some of these birds, and recoveries of the rough strain were made over 11 months after vaccination.

The reactor rate in flock No. 1, following vaccination, was 6.12 per cent. in 178 birds, and in flock No. 2, 5.83 per cent. in 240 birds. These figures are higher than the 2.4 per cent. in 208 birds quoted by Gordon *et al.* (1959), but in this case the birds had been vaccinated at 4 to 8 weeks of age. The possibility of a field infection being superimposed on vaccine-protected birds naturally received consideration. However, in only one of the 28 birds examined in detail was a smooth strain recovered. Experience indicates that where pathological changes due to virulent *S. gallinarum* infection are found in the ovary a high percentage of such tissues yield the organism on bacteriological examination. There is, therefore, presumptive evidence that the ovarian changes may be related to the persistence of the vaccinal strain in the ovary, which in turn may be associated with the development of agglutinins. Not all birds which show ovarian damage and persistence of the rough strain develop agglutinins, however, and too many inferences should not be drawn from the present results.

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THE VETERINARY RECORD

Readers are asked to note that the issue of December 26th will close for press on Monday, December 21st, and that all contributions should reach the editorial offices by that date.

Techniques for Freezing Bull Semen

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Introduction

THE development of a method for freezing bull spermatozoa in the presence of glycerol (Smith & Polge, 1950) has lead to widespread practical applications and the preservation of bull semen at very low temperatures is now carried out at many artificial insemination centres throughout the world. At the present time, however, there are very few centres which have turned over entirely to the use of frozen semen and in the majority of centres it is employed only for special purposes. There appear to be at least two reasons why this method of storing bull semen has not become more widely adopted. In the first place, it has been found at many centres that the fertilising capacity of frozen semen, especially in some bulls, is rather lower than that which can be obtained with fresh semen. Secondly, the labour and costs involved in freezing may be rather high. If therefore, low temperature storage of semen is to be exploited and extended on a large scale, it is clear that further experimental work on the methods of freezing is needed not only in order to improve the quality and fertilising capacity of the semen, but also to simplify the techniques involved so that the process may be fitted more readily into the day-to-day running of the artificial insemination centres.

The object of the work described in this paper was to investigate some simplified methods for freezing bull semen.

In the early experiments on freezing bull spermatozoa, a technique was established for the pre-treatment of semen before freezing which has formed the basis for much of the later developments in this field (Polge & Rowson, 1952). The original method involved several well defined steps which included, (1) the dilution of semen with a yolk-citrate buffer at 30° C. followed by cooling to 5° C. and storage for 4 to 5 hours ; (2) re-dilution of the cooled semen with a citrate buffer containing glycerol so that the final concentration of glycerol in the semen was 10 per cent. ; and (3) keeping the glycerol-semen mixture at 5° C. for about 18 hours before freezing. This last part of the process was referred to as the "equilibration time." In addition, (4) it was considered that a cooling rate of 1° per minute between +5 and −10° C., 4° to 5° per minute between −10° and −25° C., and thereafter faster cooling to −79° C., gave the best results as measured by the survival of spermatozoa on thawing. The importance of following each of these steps in detail, however, has not been clearly established and during the last 7 or 8 years there have been very many variations in the procedure, which have been examined by a large number of workers.

Dilution of Semen

Concerning the temperature at which the diluent containing glycerol is added to the semen, Dunn and Hafs (1953) found no significant difference in the survival of spermatozoa after freezing between samples to which glycerol was added at room temperature and at 5° C. On the other hand, Miller and Van Demark (1954) obtained better results by adding the glycerol at 4·5° C. than at 10° or 15·5° C., and Blackshaw (1955) found that the addition of glycerol to semen at temperatures above 15° C. depressed the subsequent survival rate. It seems possible that the composition of the medium in which the glycerol was added may have influenced these results which refer to sperm motility. By contrast, there seems little doubt that, under suitable conditions, glycerol can be added to bull semen at temperatures at least as high as 25° to 30° C. without impairing its fertilising capacity. In experiments where glycerol has been incorporated first into diluting fluids employed for routine insemination purposes, and such mixtures then added to the semen soon after collection, the fertility results have been satisfactory (O'Connor & Smith, 1959). In addition, Graham, Vogt and Fisher (1958) found that differences in the fertility of samples of frozen semen which had previously been diluted with mixtures containing glycerol either at 30° C. or after cooling to 5°, 10° or 20° C., were not significant. It seems likely, therefore, that the "two-step" dilution procedure described in the early method of Polge and Rowson (1952) may not be necessary and could be simplified.

Equilibration Time

There have been numerous investigations relating to the optimum equilibration time before freezing and the results have often been somewhat contradictory. Much of this work has been based on the examination of spermatozoa motility following freezing and thawing. For instance, Blackshaw and Emmens (1953) found that there was no need to allow any period of time for equilibration when diluents containing added sugars were used, and Albright,

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Ehlers and Erb (1956) were also unable to establish any beneficial effect due to equilibration even in the absence of sugars. Other authors reported maximum survival rates in semen frozen after relatively short equilibration periods such as 0·5 hours (O'Dell & Hurst, 1956), 2 hours (Miller & Van Demark, 1954) and 4 hours (O'Dell & Almquist, 1954 ; 1957). By contrast, Cragle, Myers, Waugh, Hunter and Anderson (1955) state that the optimum equilibration time is 14·9 hours and Saroff and Mixner (1955) found that there was a progressive increase in the survival of spermatozoa after freezing as the equilibration time was increased from 2 to 18 hours. A possible explanation for some of these conflicting results in the literature was suggested by Polge (1957). It was found that bull spermatozoa which were frozen within an hour following collection and dilution were severely damaged if they were kept frozen at temperatures between –15° and –25° C. for more than 5 minutes. By contrast, spermatozoa equilibrated at 5° C. for 18 hours showed a much greater resistance to freezing within this critical temperature zone. It is possible, therefore, that slight differences in the rate of freezing influenced many of the results concerned with short equilibration periods. It was further suggested that if semen was to be frozen within a few hours following collection and dilution, best results would be obtained by cooling quickly, at least through the temperature range of –15° to –25° C.

Freezing Rate

The majority of investigations concerning the rate of freezing have been based on the "slow cooling" method described by Smith and Polge (1950) and there are now a large number of papers describing the survival of spermatozoa and their fertilising capacity following various techniques of slow freezing, (Emmens & Blackshaw, 1956). The possibility of using much faster rates of freezing, however, has received far less attention. Few spermatozoa survive when ampoules of semen are transferred directly from 0° C. to a mixture of alcohol and solid CO_2 at –79° C., but if the ampoules are transferred from 0° C to crushed dry solid CO_2, when the rate of cooling is a little slower, a large number of spermatozoa may survive (Bruce, 1953 ; Polge, 1953). On the other hand, O'Dell, Almquist and Marsh (1958) found that temperature falls of 20° C. per minute, caused by transferring ampoules to crushed solid CO_2, and falls of 70° C. per minute, caused by transferring ampoules to powdered solid CO_2, were both more damaging to spermatozoa than slower rates of freezing. Another method of fast freezing was suggested by Luyet and Keane (1955). They demonstrated that a large proportion of spermatozoa may survive freezing if semen is cooled in two abrupt stages, first from 0° C. directly to –30° C. and then, after 5 minutes, directly to –195° C. So far, there have been no reports of the fertility of semen frozen by this two-stage procedure, but Bruce (1956) reported that the fertilising capacity was reduced in samples of semen frozen directly in crushed solid CO_2 although Jakobsen (1956) obtained identical fertility results with semen frozen either directly in crushed solid CO_2 or frozen more slowly. There seems little doubt, however, that under suitable conditions bull semen can be frozen at a rate considerably faster than that originally suggested (Smith & Polge, 1950 ; Polge & Rowson, 1952).

One possible disadvantage of fast freezing is that the survival of spermatozoa at –79° C. may be reduced during storage. It has commonly been found that samples of semen examined immediately after freezing show a higher proportion of spermatozoa surviving than samples examined after storage at –79° C. and most of the loss in viability appears to occur within the first 4 weeks (O'Dell & Hurst, 1956 ; Amann & Almquist, 1957 ; Graham, Erickson & Bayley, 1957). However, according to Graham, Vogt and Fisher (1958), this loss in motility during storage did not appear to affect the fertilising capacity. O'Dell, Almquist & Marsh (1958) found that a larger proportion of spermatozoa lost motility during storage in samples which were frozen quickly than in samples which were frozen slowly and experiments on the rate of freezing, therefore, must also include observations on the survival of spermatozoa during long-term storage.

From the account of the various investigations given above, it is clear that bull spermatozoa diluted in solutions containing glycerol may be frozen by a variety of techniques. The main simplifications of the procedure described by Polge and Rowson (1952) which are suggested are (1) the dilution of semen with media containing glycerol at 30° C., (2) a reduction of the equilibration time, and (3) faster rates of freezing. In the following experiments we have compared what we consider would be the simplest technique for freezing semen with the technique which is generally used by a large number of artificial insemination centres in this country at the present time. The simplified technique consists of diluting semen immediately after collection with a yolk-citrate buffer containing glycerol, and freezing ampoules of the diluted semen by placing them in crushed solid CO_2 following varying equilibration periods at 5° C.

Material and Methods

Semen

Seven ejaculates were collected from different bulls by means of the artificial vagina. Only samples of semen which showed good initial motility of the sperm were selected for experiments; 4 of the samples were first ejaculates and 3 were second ejaculates.

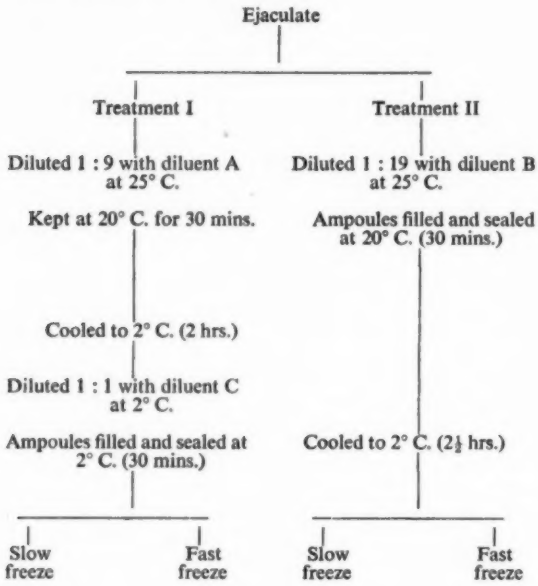
Dilution and Treatments

Within 20 minutes following collection, each ejaculate was divided into 2 equal portions and subjected to treatment I and II respectively, as shown in the diagram overleaf.

Freezing Rates

"Slow freezing"—ampoules of semen were immersed in alcohol at 0° C. and cooled at the rate of 1° per minute between 0° and –10° C., 4° per minute between –10° and –26° C., and 5° to 6° per minute between –26° and –79° C. by adding pieces of crushed solid CO_2.

" Fast freezing "—ampoules of semen were placed directly into crushed solid CO_2.


Ejaculate
Treatment I
Treatment II
Diluted 1 : 9 with diluent A at 25° C.
Diluted 1 : 19 with diluent B at 25° C.
Kept at 20° C. for 30 mins.
Ampoules filled and sealed at 20° C. (30 mins.)
Cooled to 2° C. (2 hrs.)
Diluted 1 : 1 with diluent C at 2° C.
Ampoules filled and sealed at 2° C. (30 mins.)
Cooled to 2° C. (2½ hrs.)
Slow freeze
Fast freeze
Slow freeze
Fast freeze

Composition of Diluents

A.
2·2 g. sodium citrate (2 H_2O)
25 ml. egg yolk
75 ml. distilled water

B.
2·2 g. sodium citrate (2 H_2O)
25 ml. egg yolk
7·5 ml. glycerol
67·5 ml. distilled water

C.
2·2 g. sodium citrate (2 H_2O)
25 ml. egg yolk
15 ml. glycerol
60 ml. distilled water

Diluents B and C, which contained glycerol, were added to the semen in one portion.

The rates of cooling in ampoules of semen frozen by the " slow " and " fast " method were measured by means of a thermocouple, and are recorded in Fig. 1.

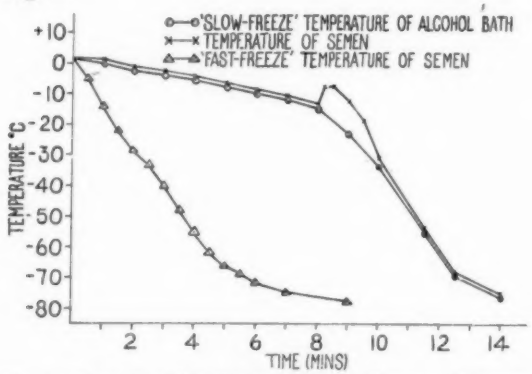


FIG. 1.—Rate at which the temperature of semen decreases on cooling by the " slow-freeze " and " fast-freeze " method.

The size of the glass ampoules used was 8 cm. × 1 cm. They were filled with 0·5 ml. of diluted semen and sealed by means of a hot gas flame.

Equilibration Time

Four ampoules from each treatment were frozen by both the " slow " and the " fast " method at 3 hours after the semen had been collected, and then similar numbers of ampoules were frozen at hourly intervals for the following 5 hours and after 24 hours.

Method of Examination

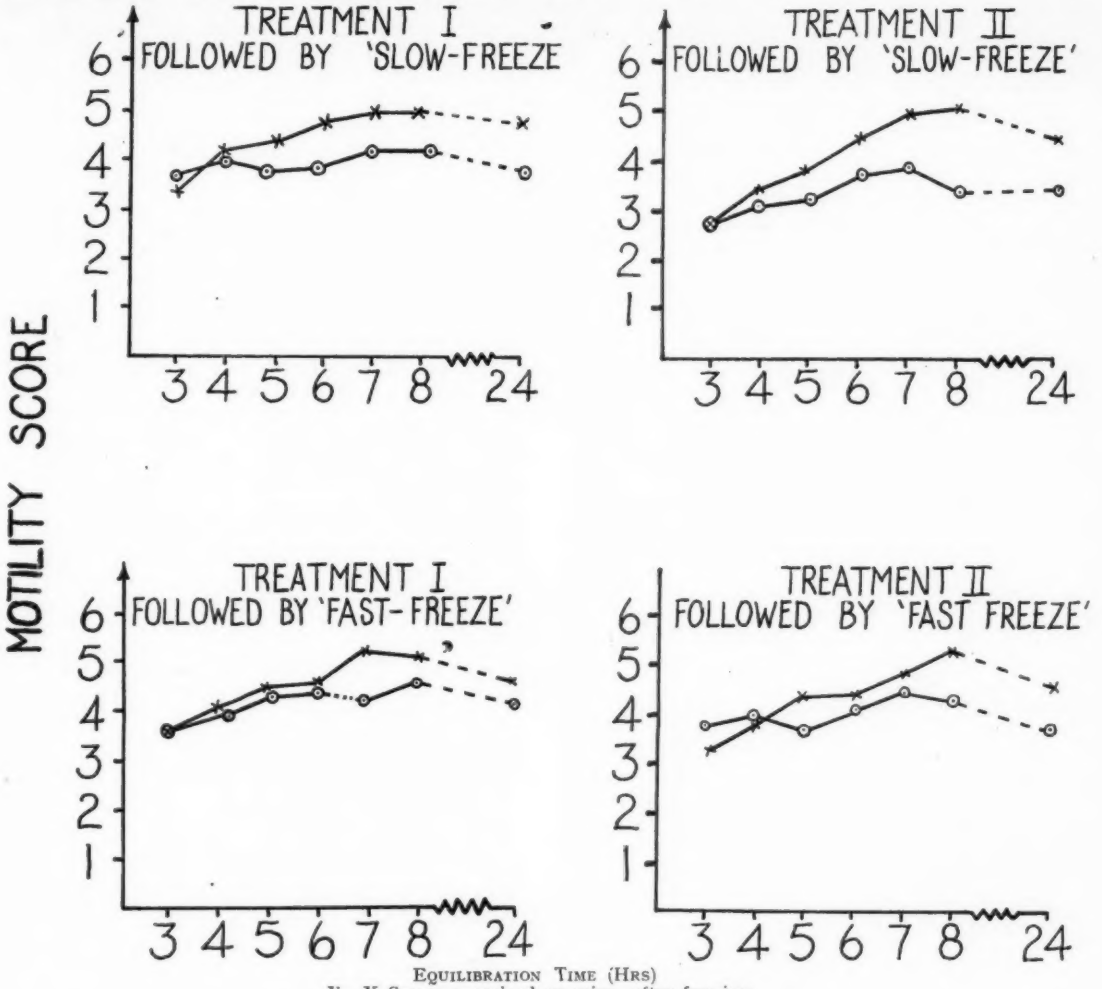
Ninety minutes after freezing to –79° C., half of the ampoules (2 from each treatment and each freezing method) were thawed in a water bath at 30° C., and the remainder were kept at –79° C. and thawed after 2 to 8 weeks' storage.

Each ampoule was marked with a code number before freezing so as to avoid bias by the examiner. When the ampoules were thawed, a small drop of semen was placed between a slide and cover glass and examined under the microscope at 37° C. Motility scores were assigned to samples on a scale of 1–10 in which each unit represented approximately 10 per cent. of sperm showing progressive motility. Each sample was examined by the two observers independently and the resulting motility scores were averaged in order to obtain the final motility estimations which are shown in the figures.

Results and Discussion

The results are shown in Fig. 2. Under the conditions of these experiments, there was very little difference between the motility of samples of semen which were frozen either by the slow or fast technique after they had been subjected to the two different methods of treatment. When ampoules of semen were thawed and examined 90 minutes after they were frozen, the number of spermatozoa surviving was always lowest in those samples which were frozen at 3 hours following the initial dilution. There was a gradual increase in the proportion of spermatozoa surviving as the equilibration time was extended up to about 7 hours following initial dilution, but survival declined in those samples frozen after 24 hours. It is interesting that the increased resistance to freezing caused by equilibration does not seem to be connected with the length of time the spermatozoa have been diluted in the glycerol solution. At the time of the first freezing, 3 hours after initial dilution, the spermatozoa in Treatment I had only been in the glycerol solution for 30 minutes whereas the spermatozoa in Treatment II had been in the glycerol solution for 3 hours. It appears, therefore, that the increased resistance to freezing is acquired simply as a result of the length of time the semen has been diluted and cooled before it is frozen.

In this work there was very little indication that the " fast " method of freezing examined was better than the " slow " one after short equilibration periods. Although the shapes of the cooling curves obtained by the slow freeze and the fast freeze methods are very different (Fig. 1), it is interesting to note that the rate at which the semen is cooled between –15°



X--X Semen examined 90 mins. after freezing.
O—O Semen examined after storage at 79° C. for 2-8 weeks.

FIG. 2.—The motility of bull spermatozoa after freezing by different techniques and thawing.

and –25° C., which we consider to be the most critical temperature zone for sperm survival, is almost identical in both methods. This is due to the fact that in the slow method of cooling, the semen supercools to about –13° C. and then abruptly freezes which causes a rise in temperature. While the semen is freezing, however, the temperature in the alcohol bath continues to fall and the temperature in the ampoule of semen then drops quite rapidly in order to approach that of the surrounding fluid.

Samples which were thawed after 2 to 8 weeks' storage at –79° C. showed quite a considerable reduction in motility as compared with those thawed after 90 minutes. The greatest loss in motility during storage occurred in those samples which had been frozen after 7 to 8 hours' equilibration. After storage, therefore, the motility in all samples tended to be levelled out although those frozen after 7 to 8 hours equilibration still remained slightly better. There was no indication that the loss in viability during storage was any greater in samples frozen by the fast method than by the slow method.

In the 7 different ejaculates which were examined, there was always an increase in the proportion of spermatozoa which survived freezing as the equilibration time was extended up to 7 to 8 hours. However, the ejaculates of some bulls reached maximum motility after shorter periods of equilibration than others. In addition to this variation within ejaculates, we noticed considerable variations in the motility of semen within the 4 ampoules which were examined for any one treatment. Although, therefore, the graphs in Fig. 2 indicate the general trend in sperm motility, deviations from these values may be caused by ejaculate and ampoule differences.

Conclusions

These experiments have been based simply on the

examination of the motility of spermatozoa and, with this limitation in mind, we would suggest that bull semen can be frozen satisfactorily by the simple technique described in Treatment II. This method consists of diluting the semen immediately after collection with a yolk-citrate buffer containing 7·5 per cent. glycerol, distributing the diluted semen into ampoules at room temperature before cooling to 2° C., and then, after 7 to 8 hours' equilibration at 2° C., freezing the ampoules by placing them directly into crushed solid CO_2. The labour saving advantages for artificial insemination centres could be considerable. The dilution of semen soon after collection with the buffer containing glycerol would reduce considerably the trouble which is caused by a second dilution after the semen has been cooled. In addition, all the filling and sealing of ampoules at room temperature would obviate the difficulty of operations within a cold room or with ampoules contained within an iced water bath. Freezing ampoules directly in crushed solid CO_2 should also reduce much of the labour involved in slower cooling processes.

Since the maximum motility is obtained in samples which are frozen 7 to 8 hours following dilution, semen could be frozen on the day of collection, when the potential fertilising capacity should be higher than that of semen which had been kept for 24 hours before freezing. It should be emphasised, however, that results based simply on motility examinations following different equilibration periods may be misleading and experiments on fertilising capacity are essential (Martin & Emmens, 1958).

Experiments on the fertilising capacity of semen frozen according to the simplified technique which we have described are already in progress and will be reported later.

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Post-mortem Findings in Some Diseases of the Central Nervous System in Cats*

BY

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I SHOULD like to make it clear at the outset that these autopsies have been purely clinical in nature; in other words I shall only describe lesions visible to the naked eye, and shall not report on any histological or bacteriological investigations.

The methods used are doubtless familiar to everyone. In the case of the spinal cord and vertebrae, after reflection of the skin and underlying structures to expose the spinous processes, the roof of each vertebral arch is removed by cutting each side of the arch with bone forceps. Thus the spinal cord is revealed in intact meninges and may easily be removed in turn to expose the bony floor of the spinal canal. The chief danger of damaging the cord is at the site of initial entry of the forceps, therefore it is wise to commence well away from the suspected level of the lesion.

The skull is opened by sawing right round the cranium which is lifted up as an intact "cap," enabling the brain in its meninges to be removed.

It seems to me that nervous diseases are less common in the cat than in the dog and I have only 8 cases to discuss which I have divided into 4 types, namely, (1) Traumatic, (2) Intervertebral Disc Lesions, (3) Unknown, and (4) Infective.

1. *Traumatic*

Undoubtedly this is the type of lesion most frequently encountered in practice and is often due to road accidents. The common fracture of the skull from impact with the hub cap of a car immediately springs to mind. However, I shall only describe one case of fracture and luxation of the cervical vertebrae.

Case 1. This was an adult male cat brought in after a street accident. It lay in spastic lateral recumbency, with tetanic spasms of the limbs. It had no righting reflexes. The pedal reflexes were present in the hind legs and absent in the forelegs. It was destroyed.

Autopsy revealed superficial bruising above the right eye, but the skull was intact and there was no cerebral haemorrhage. There was considerable subcutaneous bruising of the withers. Dissection of the cervical vertebrae showed fractures of the 3rd and 4th spinous processes, and upward luxation of the 7th cervical vertebra, so that its body was projecting into the canal of the 6th. The spinal meninges at the site were intact.

* Paper presented to a meeting of the Society of Women Veterinary Surgeons on June 3rd, 1959.

2. *Intervertebral Disc Lesions*

Here I am venturing upon very controversial ground. As far as I am aware, the only account of these lesions in the cat is given by King *et al.* (1958), who examined the spines of 100 adult cats which were taken at random with no reference to symptoms. They found dorsal disc protrusions in 26 of these cats, and many of them had multiple protrusions. The cervical region was most commonly affected, but there were almost as many protrusions in the lumbar region.

Two of the 3 cases following bear out King's theoretical expectation that mild or chronic symptoms might occur in aged cats.

Case 2. This was a cat about 13 years. It had been lame in its right foreleg 1 to 2 weeks previously and had almost recovered; it then became disinclined to move, and finally developed inco-ordination of the hind limbs. It showed severe pain on pressure of the thoracico-lumbar region. X-ray examination showed opaque dorsal projections above intervertebral spaces L 4/5 and L 5/6. It was destroyed.

On *post-mortem* examination the spinal cord appeared to be normal, but 6 intervertebral discs showed varying degrees of abnormality. Those between thoracic vertebrae 5/6 and 6/7 were not raised but had a yellowish discoloration which is regarded as an early sign of degeneration. Lumbar disc 1/2 was slightly ridged and L 4/5 and L 5/6 showed prominent ridges, both with knob-like projections to the right of the mid-line and very slightly anterior to the centre of the space.

On transverse section the disc contents were dry with no normal nucleus pulposus and the projection at L 4/5 was calcified.

Case 3. This was a castrated male cat aged 15 years. It was seen 6 weeks previously for chronic catarrh, otitis externa, and weakness of the hind legs. The infections improved with antibiotic therapy, but varying degrees of inco-ordination persisted. Finally there was posterior paresis and 24 hours later it was found dead.

No abnormalities could be found in the auditory canals or brain. On reflection of the spinal cord the dura was found to be slightly adherent to the floor of the canal at the junction of the 6th and 7th cervical vertebrae and the underlying disc was raised into a fairly prominent ridge. There were slight swellings at T 7/8 and T 13/L 1. At space L 1/L 2 there were two small lateral knobs and at L 2/L 3 similar but rather larger ones. On transverse section the contents of the affected discs were dry and fibrous, with no nucleus.

Case 4. This was an 8-year-old castrated male which had shown some weakness of the hind limbs for several weeks. It made a partial recovery, relapsed, and was destroyed at the owner's request.

On *post-mortem* examination the only lesion to be found was a slight ridge at L 1/2.

It is always difficult to correlate the severity of clinical symptoms with the pathological findings in the above type of disc lesion, where there is protrusion, but no sudden rupture of the disc with forcible discharge of its contents into the canal. The size of the protrusion is certainly not the deciding factor as very large ones associated with few symptoms have been seen in the dog.

The exact site is probably of more importance; dorso-lateral "knobs" may press upon the nerve roots as they leave the cord to pass through the intervertebral foraminae. These foraminae may also be narrowed by the osteophyte formation which often accompanies disc degeneration. Central lesions may interfere with the blood flow in the ventral artery of the cord and nervous tissue is notoriously susceptible to even mild degrees of ischaemia. Small arteries pass through the intervertebral foraminae to supply the dorsal and ventral arteries of the cord. These tributaries vary considerably in size at different levels, and in man it is believed that partial obliteration of a large one may result in ischaemia of the cord at some distance from the site of the lesion.

This theory is not substantiated by Bradshaw (1958) who examined the arteries of the spinal cord in the cat and found the larger lateral tributaries to be more numerous than in man. There was a large branch constantly present on the left side at L 4, but ligation of this did not prevent filling of the ventral artery, nor was he able to find changes in the gross histology of the cord subsequently. However, he does not state the ages of his cats and if they were young one would expect a more efficient alternative blood supply than in the aged animals that usually suffer from the natural lesions.

I have examined the discs of 5 cats aged 11 to 17 years with no history of locomotor disturbance, and in 4 of these there was no sign of a protrusion. The remaining one, aged 17, had 3 lumbar discs and 1 thoracic disc raised into small ridges, but there were no localised "knobs." Although so few in number, these as least suggest that disc displacement is not inevitable in the ageing animal and encourage one to suspect these lesions of causing symptoms in certain cases.

To revert to a consideration of the 3 cases I have described in detail, I would suggest that in the first of these, *i.e.* Case 2, the protrusions found were sufficiently severe to account for the symptoms. In Case 3, although the spinal lesions were obviously not the cause of death, I think they may have been responsible for the inco-ordination. The adhesion of the meninges to the floor of the canal at C 6/7 is interesting; these adhesions are quite commonly found in the dog but in the posterior thoracic or lumbar region.

In Case 4, I do not think one can incriminate the single small ridge that was the only finding, although it is possible that histological sections of the cord might have shown changes due to interference with the blood supply. It is equally possible, however, that some quite different condition might have been disclosed.

I realise that my remarks on these 3 cases are speculative and I would welcome comments on them.

3. *Unknown Origin*

This brings me to another puzzling case, the only one with completely negative findings:—

Case 5. An adult cat with mild ascending paresis, in which I could find no abnormalities at all. Again,

histological examination might well have been informative.

4. *Infective Lesions*

I should like to emphasise the following 3 cases of abscesses in the brain and spinal canal as sepsis is a common condition in the cat and these cases show two routes by which it may spread to the central nervous system with the inevitably disastrous results.

Case 6. This was a castrated male cat aged about 10 years. For 2 to 3 days it had become increasingly dull with inappetence and vomiting, and was very reluctant to move. On examination it was found to be inco-ordinate, with fixed dilated pupils, and showed pain and fear on movement and palpation of the occiput. It was destroyed.

On *post-mortem* examination the cerebral hemispheres were found to be congested and their meninges under increased tension. There was a large abscess on the superior surface of the cerebellum, and a linear area of thickening of the meninges on the inferior surface of the pons and medulla. There was necrosis of the left middle ear and petrous temporal bone, but the external auditory canal appeared to be normal. There were no lesions in the spine and the general condition of the cat was good.

Presumably this was a case of middle ear infection where the tympanic membrane had failed to rupture as it usually does, and the pus had made its way into the cranium instead of escaping relatively harmlessly into the external ear.

Case 7. This was a 3½-year-old castrated male which had been presented for treatment one month previously with abscesses in the right shoulder and left gluteal regions. The gluteal abscess was opened and drained, and a single injection of penicillin was given intramuscularly. There was apparent recovery until the last 3 days when hind leg weakness gradually developed. On examination the cat was unable to stand and all pedal reflexes were absent. It was destroyed.

Autopsy revealed a deep-seated abscess in the right gluteal muscles extending to the spine at the sacro-coccygeal junction. Here there was necrosis of the vertebral bodies on the right lateral aspect, and extensive epidural sepsis; the spinal canal contained pus right up to the cervical region.

Abscesses around the base of the tail frequently occur in the cat, and this case illustrates their potential danger and the necessity for repeated examinations in view of the fact that apparent healing often follows a single dose of an antibiotic.

Case 8. This was an 8-year-old castrated male which had lost the use of its legs for 5 days. On examination there were weak pedal reflexes, the feet were cold, but the femoral pulses were present and strong. There was pain on palpation of the lumbo-thoracic region of the spine. There was no response to a few days' symptomatic treatment and the cat was destroyed.

On *post-mortem* examination the dorsal vertebral vein visible on the surface of the cord was obviously

(*Concluded in adjoining column*)

Post-mortem Findings.—*Concluded.*

engorged in the lumbo-sacral region. On the floor of the canal over the body of the 4th lumbar vertebra there was a large deposit of fat covering an abscess containing liquid pus. There was erosion of the underlying bone but no sinus could be found. The inferior surface of the vertebra was softened and pitted. There were small hard ridges over the thoracic intervertebral discs 11/12 and 12/13.

The route of infection in this case could not be traced. It offered an interesting differential diagnosis from the posterior paralysis that occurs in iliac thrombosis.

In conclusion, may I hope that these descriptions show how easy it is to demonstrate gross lesions of the central nervous system by using quite simple autopsy procedures. Though I am aware that pathologists would regard these methods as both crude and incomplete, at least they are not too time-consuming and so are a practical possibility for the general practitioner.

Acknowledgment.—All the cases, together with their clinical findings, came from Miss J. O. Joshua, and I should like to thank her most sincerely, not only for supplying these cases but also for allowing me to carry out the *post-mortem* examinations at her premises—not infrequently late at night!

References

BRADSHAW, PETER (1958). *J. Neurol. & Psychiatry.* **21.** No. 4. 284.

KING, A. S., *et al.* (1958). *Vet. Rec.* **25.** 509.

Current Literature

BOOK REVIEWS

Endocrines in Development. Edited by ROY L. WATTERSON. (1959). University of Chicago Press, Cambridge University Press. London. 30s.

The Developmental Biology Conference Series was held in New York in 1956. This was considered under 10 sections one of which concerned endocrines in development. Watterson attended this section of the conference as an observer and has now edited the proceedings in a shortened version in this book. He has refrained from making direct quotes, but this does not detract from the continuity of the book.

The discussion in this section was subscribed by 14 invited participants from different fields of study. The accent was on informality with a free exchange of ideas with the object of discussing thoroughly a few points of key interest about the role of endocrines in the autogenetic process, rather than attempt to review progress in the whole field. Each subject was introduced by the chairman who opened the discussion by framing certain questions for the other members to answer and discuss.

The ontogeny of the thyroid, adrenals, gonads and parathyroids is discussed. Other important aspects considered are the development of the endocrine receptors and the conditioning effect of these organs. An important feature in the study of the endocrines is not only the effect of these organs, but the integration of the whole endocrine system. There was an admirable discussion on this in which stress was laid

by one person on the lack of discrimination between the effects of hormones on growth, on differentiation, on production and on discharge of secretion from an organ.

The book has been well produced and a few diagrams have been included, which help to clarify some of the hormone interactions.

This book will be a valuable contribution in assisting in the understanding of the endocrine system and by its nature it should appeal to the general reader as well as the specialist.

Scientific Principles of Feeding Farm Live Stock. Proceedings of 1958 Brighton Conference. (1959). With 259 pp. and numerous tables and diagrams. Farmer & Stockbreeder Publications, London. 50s.

This volume, which is the account of a conference convened to discuss the subject matter described by its title, has many excellent qualities and 2 bad ones.

The Conference Chairman was Dr. D. P. Cuthbertson. Under his guidance a number of authorities on the feeding of the different farm animals outlined their views on the present state of scientific knowledge concerning the various farm species. Thus the contributors included Blaxter (dairy cows), Roy (calves), Dodsworth (beef cattle) and Phillipson (sheep), Lodge and Lucas (breeding and rearing pigs), Braude (growing and fattening pigs), Duckworth (rearing and table birds) and Bolton (laying and breeding birds). Comparatively little over-lapping of material followed this system of organisation.

In each instance the paper presented was discussed, first by an invited opener of the discussion and then by other interested individuals. It is not possible in a short review to attempt to give an extended account of the up-to-date material presented by the various speakers. Many current references were provided by all of the principal speakers. The papers need to be digested and no taste such as might be given here can indicate their real flavour.

The publication of the volume introduces a number of issues. For one thing it is noteworthy that this Conference to discuss scientific principles was due to the initiative, not of any of our numerous research organisations, but to a farming journal, to which much credit is due. In view of the fact that many people, including a fair proportion of members of our profession, hold the view that nutrition is " theory " whilst animal feeding is " practice "—and never the twain shall meet !—one is the more interested to see a farming journal showing keen interest in this field. One might well wonder why this kind of meeting had never been convened by the relevant official bodies. Nevertheless, whatever conclusions one may come to as the result of such speculations, one notes with relief that the Agricultural Research Council, after considering two resolutions put to it by this Conference, has agreed to set up a technical committee to make arrangements for possible future conferences and to review every two years the literature on the nutrient requirements of farm livestock. In recent years the Ministry of Agriculture, Fisheries and Food has published many useful bulletins on plant and animal husbandry, but information on fundamental principles, such as is published regularly by the U.S. National Research Council, has never appeared.

With the present urge towards increasingly intensive methods of animal production, *ad hoc* nutritional work on the larger animals becomes less and less useful. Investigation in breadth and depth is necessary. Such work is inevitably expensive and requires both money and a co-ordinated plan. To the extent that this volume is likely to assist integrated efforts, it is doubly welcome. From the veterinary profession must come an increasing interest in disease prevention if this domain is not to pass entirely to the specialist in animal husbandry.

Lastly, one comes to the 2 bad points mentioned in the opening paragraphs. Symposia of this kind, where there is free discussion, need good editorial pruning of the discussion, otherwise one tends to drift towards the style of some—only a minority—of the symposia produced across the Atlantic, in which every cough is faithfully printed. The reviewer would have liked to see this discussion sharply edited. This may be a personal point of view, but it has other implications, for books, however good, are of no value if they are not read. The price of this volume may be too high to allow all of those who are interested to buy their own copies, for it is a book to be taken down from the shelf and read and thought about frequently : the copy in the official library does not normally permit such essential usage.

The Horseman's Year 1960. Edited by DORIAN WILLIAMS. Collins, Publishers, London. 18s.

This review of a year of equestrian activity appears once again in its usual guise. It is often said that a book contains something for everyone, but here it is literally true for any person having the faintest interest in the horse, and surely that must be everyone in our profession no matter what their sphere of action.

Racing—flat, over fences and point-to-point—combined training, show jumping, showing, polo, all are covered in text and picture ; for its illustrations alone this book is a most worthwhile possession, making it a unique record. A member of the profession, George Forbes, contributes one of his inimitable articles on his experiences abroad, this time in India and Malaya. The views of R. S. Summerhays in the chapter on " Breeding for Bone " will interest many veterinary surgeons.

The book is very well produced, in clear print and beautifully illustrated. It is a pity that the text suffers from spelling errors; often the offending word or name is mis-spelt in several different ways !

" Horseman's Year " should appeal to all and I suspect may solve the Christmas present problem for many.

BOOKS RECEIVED

How Animals Talk, by R. H. Smythe, M.R.C.V.S. (1959). Country Life Ltd., London. 18s.

Soil, Grass & Cancer, by André Voisin (1959). Crosby Lockwood Ltd., London. 30s.

Reproduction in Domestic Animals, Vol. 2, H. H. Cole and P. T. Cupps (1959). Academic Press Inc., New York and London. 93s.

Profitable Pig Farming, by Geoffrey Johnson (1959). Dairy Farmer (Books) Ltd., Ipswich. 25s.

The Calf: Its Management, Feeding & Health, by J. H. B. Roy, M.A., DIP.AG., PH.D. (1959). Farmer & Stockbreeder Publications Ltd., London. 9s. 6d.

Pendley & a Pack of Hounds (1959), by Dorian Williams. Hodder & Stoughton, Ltd., London. 21s.

Pig Breeding, Recording & Progeny Testing in European Countries (F.A.O.), published by H. M. Stationery Office. 5s.

Milk Testing (second edition revised), by J. G. Davis, D.SC., PH.D., F.R.I.C., M.I.BIOL., F.R.SH. (1959). Dairy Industries Ltd., London. 30s.

Tiergeburtshilfe, by J. Richter and R. Gotze. Paul Parey, Berlin and Hamburg. DM. 178.

British Veterinary Codex 1953 (Supplement 1959). The Pharmaceutical Press, London. 35s.

REPORT

Report of the Veterinary Department, Sierra Leone, 1957.

In his 8-page report for 1957 the Director of Veterinary Services, Mr. J. D. Birkett, M.R.C.V.S., deals almost entirely with livestock diseases in the Colony and Protectorate.

Rinderpest was again successfully kept at bay and by the end of the year not a single outbreak had occurred for over 4 years. Credit for this very satisfactory state is given to the continued policy of maintaining a high level of immunity in the country's herds by annual vaccination. During the year under review nearly 30,000 cattle were protected. Lapinised vaccine, either as dried virus obtained from the Federal Veterinary Laboratory, Nigeria, or as wet vaccine made locally in Sierra Leone, was used. This vaccine, which has proved eminently satisfactory, has been shown to produce an effective immunity in the local N'Dama cattle in 72 to 84 hours after inoculation which will protect them for at least 4 years—to all intents and purposes a lifelong immunity.

Contagious bovine pleuropneumonia occurred in the Northern Province and caused considerable anxiety for a time. However, the combination of strictly imposed stand-still orders and the use of a locally-produced culture vaccine, which although of limited value appeared to help, prevented an epizootic occurring and kept mortality to a commendably low level.

Contagious abortion, first diagnosed at the Musaia Livestock Improvement Centre in 1954 and since controlled by S.19 vaccination, now appears to be present as a low-grade infection in many herds in the territory. S.19 vaccination is to be extended where feasible.

Anti-anthrax vaccinations were carried out on some 6,000 cattle, sheep and goats. As a result of extensive bush clearing and reduction in tsetse-flies trypanosomiasis in pigs on an Agricultural Department farm was less prevalent than in previous years ; it is interesting to note that the incidence of abortions, which in the past were believed to be associated with the trypanosomiasis, was also greatly reduced. Rabies is still a menace to public health in the Protectorate.

Newcastle disease, first diagnosed in Sierra Leone in 1953, is of considerable economic importance, causing heavy losses of poultry. Demands for vaccination, which has proved very effective, are, however, increasing rapidly each year, and with the object of extending this service to the more remote areas of the territory a special mobile vaccination unit is to be formed. Nearly 92,000 birds were vaccinated during the year.

As far as the somewhat limited facilities permit a small laboratory service is maintained but one can detect a *cri de coeur* in the comment that " the most urgent need is for an electricity supply. Far too long we have been compelled to work under primitive conditions, using kerosene-operated apparatus which is unreliable and unsatisfactory."

The report contains practically no references to animal husbandry and no figures of livestock populations. But as the major epizootic diseases are got under control the cattle population is steadily increasing and it is claimed that there are more cattle in Sierra Leone to-day than ever before. Malnutrition is, however, still the cause of much mortality and to those veterinary surgeons who have worked in underdeveloped countries the final sentence of the report, " It is not yet generally realised that good feeding is one of the greatest adjuncts to health in all animals," will have a familiar ring and a special significance. Mr. Birkett and his small band of three Veterinary Officers can take comfort in the knowledge that their efforts are bearing fruit, slow maturing and small though it may at times seem to be. W. E. L.

FOOT-AND-MOUTH DISEASE

Foot-and-mouth disease was confirmed on December 12th among cattle at Bromyard (within the existing Infected Area around Sytchampton Omberley, Worcs.).

The Infected Area has been extended to include all land within about 5 miles' radius of the location of the new outbreak.

The Area has also been extended to include Birmingham, Smethwick, Oldbury, Rowley Regis, Halesowen, Stourbridge, Brierley Hill, Amblecote and Quarry Bank.

Anyone wishing to move animals within or into the City of Birmingham or any other part of the Infected Area, must obtain a licence.

FOWL PEST :

Withdrawal of Restrictions in Central Gloucestershire

As from December 13th the Infected Area restrictions affecting the movement of poultry in Central Gloucestershire and north-west Wiltshire have been withdrawn. The fowl pest situation in this particular area has shown a marked improvement and it no longer necessitates the maintenance of these restrictions which were imposed on October 16th in order to limit the further spread of the disease.

Infected Area restrictions are, however, being maintained around Stratford-upon-Avon, Shipston-on-Stour and Evesham and in the Pershore district of Worcestershire where outbreaks of fowl pest are still occurring.

News and Comment

CONVERSAZIONE OF THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE

The Parliamentary and Scientific Committee invited over 30 organisations associated with science and research to take part in an exhibition demonstrating their activities in the field of scientific research and its application. This exhibition was held on Wednesday, December 9th in collaboration with the Royal Society at its headquarters in Burlington House, London.

The R.C.V.S. and the B.V.A. were represented by an exhibit organised and manned by the British Veterinary Association. Dr. Wooldridge, Vice-Chairman of the Committee, had arranged for this exhibit to be complementary to those of the British Feed Manufacturing Industries Research Association and the Cereals Research Station of the Research Association of British Flour-Millers; in this way it was hoped to stress the obvious importance of a high standard of animal health which could be brought about by applied veterinary research in collaboration with these industries, the aim being to provide an increase in pure food to meet the needs of a rising world population with an improved standard of living.

The veterinary panel displayed the successful results of tuberculin testing in Britain with graphs showing the remarkable herd attestation figures of 11 per cent. in 1946 to 93 per cent. in 1959, and the probability of having the whole of Britain attested by late 1960 or early 1961. Morbid specimens were shown to illustrate tubercular material encountered in previous meat inspections which were not likely to be anticipated in the future. Many vaccines for cattle, sheep and pigs were featured and mention was made of the veterinary research work associated with the rapidly developing broiler industry in Britain. Mastitis was featured in a panel by itself and was supported by samples of milk, cultured material and slides which were shown under the microscope to illustrate some of the organisms responsible for the disease.

The stand told the story of continuing success by the veterinary profession in increasing animal productivity and health through co-operation with the farming industry.

On Wednesday afternoon the Press was given a preview and in the evening approximately 500 parliamentarians and scientists visited the exhibition. Prominent among the latter was the Minister of Science, Lord Hailsham, and many other senior political and scientific personages showed particular interest in the veterinary demonstration.

Dr. W. R. Wooldridge represented the Royal College of Veterinary Surgeons and the B.V.A. on the stand, and the President of the B.V.A., Mr. S. L. Hignett, and the Secretary designate, Mr. J. Anderson, were also present to answer questions and enquiries.

The organisers of the veterinary exhibit wish to acknowledge the help given by Dr. Cotchin, Royal Veterinary College; Mr. W. Macrae, Tolworth; Mr. Carmichael (Visual Aids) Ministry of Agriculture; Mr. C. D. Wilson, Weybridge; in making specimens, etc., available. They also wish to thank the commercial companies for the loan of various exhibits.

J. A.

"FARMING" ON B.B.C. TELEVISION

On Sunday, December 20th, at 12.40 p.m., the B.B.C. "Farming" programme will deal with obstetrics. The talk will be given by a veterinary surgeon, and as approximately 80 per cent. of the farmers in Great Britain and Ireland are expected to switch on their television sets, members of the profession might find it useful to watch the programme.

APPOINTMENTS IN THE OVERSEAS VETERINARY SERVICES

Dr. H. G. Hutchison, B.SC.(AGRIC.), Livestock Officer, Tanganyika, has been promoted to Livestock Research Officer, Veterinary Department, Tanganyika.

New appointments include Mr. R. B. Blatcher, M.R.C.V.S., as Veterinary Officer, Dominica, Windward Islands; Mr. P. G. T. Moren, VET.LEG. (Stockholm), as Veterinary Research Officer, Federation of Nigeria; Mr. I. G. N. Smith, M.R.C.V.S., as Veterinary Officer, Kenya; and Mr. A. B. Peden, B.SC., M.R.C.V.S., as Veterinary Officer, Uganda; and Mr. E. H. Holland, B.SC.(AGRIC.), M.R.C.V.S., Veterinary Officer, North Borneo, now becomes Superintendent Veterinary Officer (post re-designated).

PERSONAL

Dr. A. W. Stableforth attended a meeting of the World Health Organisation in Geneva from December 16th to 18th to discuss tuberculins and tuberculin testing, also matters affecting biological standardisation.

Births

BROCKLESBY.—On December 9th, 1959, at the Princess Elizabeth Hospital, Nairobi, Kenya, to Jennifer, wife of D. W. Brocklesby, a daughter, Susan, a sister for Sarah.

MARKHAM.—On December 13th, 1959, at Downside, Langport, Somerset, to Rosemary, wife of Keith Markham, M.R.C.V.S., a son, David Mackenzie, a brother for Jane.

MILLER.—On November 21st, 1959, at E.I.M.H., Edinburgh, to Jean (*née* Jean Greig, M.R.C.V.S.) wife of Alexander M. H. Miller, a daughter, Anne Catherine, sister for Alexander and David.

COMING EVENTS

January, 1960

6th, 7th and 8th (Wed., Thurs. and Fri.). Committee and Council Meetings of the Royal College of Veterinary Surgeons at 10 Red Lion Square, London, W.C.1.

13th (Wed.) Meeting of the Southern Counties Veterinary Society at the Royal Hotel, Winchester.

20th (Wed.) 11th Anniversary Dinner-Dance of the University of Bristol Centaur Society at the Berkeley, Clifton, Bristol.

BRITISH VETERINARY ASSOCIATION

Quarterly Meetings in London

Tuesday, January 19th, 1960, at 7 Mansfield Street.
5 p.m. Finance Sub-committee.

Wednesday, January 20th, at 7 Mansfield Street.
10 a.m. Farm Livestock Committee.
11.30 a.m. Parliamentary and Public Relations Committee.
2.15 p.m. Veterinary State Medicine Committee.
4.30 p.m. Home Appointments Committee.

Thursday, January 21st, at 7 Mansfield Street.
10 a.m. Small Animals Committee.
2.15 p.m. General Purposes and Finance Committee.

Friday, January 22nd, at Connaught Rooms, W.C.2.
10.15 a.m. Council Meeting.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Dumfries. Airdrie Farm, Kirkbean (Dec. 9).
Kinross. Wester Balgedie Farm (Dec. 11).

Foot-and-Mouth Disease

Glos. Manor Farm, Longney (Dec. 13).
Hereford. Instone House, Tenbury Road, Bromyard (Dec. 12); Orley Farm, Redhill, Bredenbury, Bromyard (Dec. 13).
Worcs. Pardoes Farm, Sytchampton, Ombersley, Droitwich; Dodden Hill, Newnham Bridge, Tenbury Wells (Dec. 10); Sarthmeet Farm, Mamble, Kidderminster (Dec. 12).

Fowl Pest

Berks. Lavells Farm, Stratfield Saye, Reading (Dec. 8); Rambler Cottage, Stratfield Saye; The Stores, Stratfield Saye, Reading; Weston Green, Stratfield Saye, Reading (Dec. 10).
Bucks. Kingsbury House, Wendover, Aylesbury (Dec. 8).
Cambs. 29, Hill Row, Haddenham, Ely; Prospect House, Pious Drove, Upwell, Wisbech; Hawthorn Farm, Chittering, Waterbeach; Laurel Farm, Chittering, Waterbeach; The Bungalow, Earith Road, Willingham; Iram Farm, Cow Lane, Rampton; Road Farm, Wendy, Royston; 87, High Street, Cottenham; Rampton Drift, Long Stanton; Providence Villa, Pious Drove, Upwell, Wisbech; 3, High Street, Willingham (Dec. 8); 108, High Street, Cottenham; Gos Road Allotments, March; Beech Farm, Harston; Fruit Farm, Chittering, Waterbeach (Dec. 9); Pious Drove, Upwell, Wisbech; Riverview, Harston; 14, Pound Road, Chatteris; Hall Farm, Outwell, Wisbech (Dec. 10); Meadow Lane, Over; Kirby Farm, Over; Chainbridge Farm, March (Dec. 11).
Cumbs. Wreay Syke, Wreay, Carlisle (Dec. 10).
Dumfries. Cornhill Farm, Eaglesfield, Lockerbie (Dec. 11).
Essex. Langdale, Park Lane, Ramsden Heath, Billericay (Dec. 11).
Hants. The Anchorage, Salisbury Road, Broughton, Stockbridge (Dec. 9); Bunkers Hill Farm, Rotherwick, Basingstoke (Dec. 11).
Herts. Southfield Farm, Buntingford (Dec. 10).
Hunts. No. 3 Council House, Grafham Road, Ellington (Dec. 8).
Kent. Lodge Hill Farm, Rochester; Chatterden Farm, Lodge Hill, Rochester; Featherstone Cottage, Smarden, Ashford; Haffenden Quarter, Smarden, Ashford; Little Cossington Farm, Aylesford, Maidstone (Dec. 10); Tueswood Farm, Smarden, Ashford (Dec. 11).
Middx. Mead Farm, Shepperton (Dec. 9).
Norfolk. Whitehouse Farm, Etling Green, Dereham; Railway Allotments, North Walsham; Holbrook House, Alburgh, Harleston; The Vale, Low Road, Wortwell, Harleston; Foster Meadow, Wortwell, Harleston; Broom Cottage, Swannington, Norwich; Booton Hall, Booton, Norwich; Police Station, Palgrave, Diss; Baynes Hill Farm, Denton, Harleston; High Road, Wortwell, Harleston; The Shop, Crowgate Street, Tunstead, Norwich; Repos de Celibiate, Norwich Road, Mattishall, Dereham (Dec. 8); Bean Grove, Salhouse, Norwich; 18, Stonehill, Rackheath, Norwich; Hall Lane, Hardwick, Norwich; Street Farm, Hardwick, Norwich; Church Farm, Tunstead, Norwich; Goose Green Farm, Winfarthing, Diss; Gun Street, Foulham, Dereham; Premises at Main Road, Fakenham Magna, Thetford; Wood Farm, Fersfield, Diss (Dec. 9); The Bungalow, Friars Lane, Burnham, Norton, King's Lynn; Fen Farm, Market Weston, Diss; Market Street, Shipdham, Thetford; The Old Rectory, Reepham, Norwich; Fir Tree Farm, Redgrave, Diss; Church Villa, Shelfanger, Diss; East End Farm, Billingford, Dereham (Dec. 10); Culpitts Farm, Melton Constable; High Street, Bressingham, Diss; The Lime, Ollands Road, Reepham, Norwich (Dec. 11).
Notts. Pear Tree Farm, Kinoulton (Dec. 8); 186, Longdale Lane, Linby; Redgate Farm, Reckett Lane, Blidworth, Mansfield (Dec. 9); The Bungalow, Heckledale Lane, Bilsthorpe, Newark (Dec. 10); Little Leyfields Farm, Kneesall, Newark; Fir Tree Farm, Edwinston, Mansfield; 214, Longdale Lane, Linby (Dec. 11).
Suffolk. Deep Litter House, School Lane, Coddenham, Ipswich; Poplar Farm, Cretingham, Woodbridge; Wood Farm, Henley, Ipswich; Morgans Cottage, Stonham Aspal, Stowmarket; 43, Mildenhall Road, Bury St. Edmunds; Charity Farm, Hemingston, Ipswich; Whitehall Old Newton, Stowmarket; The Street, Brockford, Stowmarket (Dec. 8); 5, Kiln Row, Woolpit, Bury St. Edmunds; Redhouse Farm, Barham, Claydon, Ipswich; Hilltop Poultry Farm, Little Welnetham, Bury St. Edmunds; Briswell Green, Thorndon, Eye; The Allotments, Stonham Aspal, Stowmarket; Shrublands, Brockford, Stowmarket; Haugh Farm, Great Ashfield, Bury St. Edmunds; Manor Farm, Topcroft, Bungay; Church Farm, Occold, Eye (Dec. 9); Elm Tree Farm, Mellis, Eye; The Firs, Old Newton, Stowmarket; Lower Airfield Premises, Topcroft, Bungay (Dec. 10); Ivy House, Helmingham, Stowmarket; Dunromin, Rectory Road, Mellis, Eye; Red House Farm, Creeting St. Mary, Ipswich; Grange Farm, Stowupland, Stowmarket; Rowan House, Thorndon, Eye; Hillcrest Cottage, Hemingstone, Ipswich; 12, Hestley Green, Thorndon, Eye; 88, High Street, Lakenha, Brandon; The Potash, Cretingha, Woodbridge (Dec. 11).
Sussex. 147, Lyndhurst Road, Worthing (Dec. 9).
Warwicks. The Mile, Welford-on-Avon, Stratford-on-Avon (Dec. 11).
Worcs. Lyth Poultry Farm, Line Holt, Ombersley, Droitwich (Dec. 11).

Swine Fever

Cambs. Phypers Farm, Drayton Road, Oakington (Dec. 9).
Ches. Rendova Farm, Poey Lane, Saughall, Chester (Dec. 11).
Devon. Moor View, Cheriton Bishop, Exeter (Dec. 8).
Dorset. Ranston Hill, Shroton, Blandford (Dec. 8).
Essex. Hyde Farm, Duton Hill, Great Easton, Dunmow; Kirby Farm, Duton Hill, Great Easton, Dunmow (Dec. 8); Riverside Lodge Farm, Collier Row, Romford (Dec. 9); Greenacres, De Beauvoir Chase, Downham, Wickford (Dec. 10).
Lancs. Mount Pleasant Farm, Simister, Prestwich, Manchester (Dec. 8); Vicars Hall Farm, Boothstown, Manchester (Dec. 11).
Leics. Field Farm, Shepshed, Loughborough (Dec. 9).
Monts. Bridge House, Welshpool (Dec. 10).
Norfolk. Cherry House, Alpington, Norwich (Dec. 9).
Oxford. Manor Farm, Duns Tew (Dec. 9).
Somerset. Parsonage Farm, Mudford, Yeovil (Dec. 10); Barrow Court Farm, Tickenham, Nailsea, Bristol (Dec. 11).
Suffolk. Low Farm, Worlingworth (Dec. 8).
Surrey. Farleigh Piggeries, Farleigh Court Road, Warlingham (Dec. 10).
Warwicks. Arnhills Gate Farm, Kilsby, Rugby (Dec. 9).
Wilts. Court Farm, South Wraxhall, Bradford-on-Avon (Dec. 8).
Worcs. Lea End Farm, Perrysfields, Old Birmingham Road, Alvechurch, Birmingham (Dec. 10).
Yorks. Station Farm, Church Fenton, Tadcaster (Dec. 8).

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Twin Calving

Sir,—With regard to the twin calving experiment upon the merits of which Mr. Grant and Mr. Tutt have expressed doubts in letters recently published in THE VETERINARY RECORD, many practitioners will hold similar views.

It cannot be denied that the production of twin calves, in most cases, has a markedly adverse effect on the condition of the dam: apart from the probability of the retention of the placenta, with all the hazards which may attend such an accident, it is usually not difficult to pick out of a herd the animals which have given birth to twins.

For some time I have intended to record a case which we encountered in this practice. In the first place to establish the fact of its occurrence and, secondly, to enquire into the incidence of such cases throughout the country. Though it is an extreme case I think that the sequel has some bearing on the proposed experiment.

The details are these: in December of last year we received a request to visit a Shorthorn cow, carrying her second calf, which had suddenly become very distressed in breathing, "probably a case of pneumonia." I managed to get to the case quickly and fortunately realised at once that the cow was trying to calve though her time was a month off. I had, for me, the unique experience of delivering 4 live, normal calves; 1 bull and 3 heifers, weighing 34, 38, 39, and 41 lb.—152 lb. in all. As may be imagined the cow presented a somewhat hollow appearance after the calving; nevertheless she stood up, ate and ruminated. 10 c.c. of Pituitrin were injected intramuscularly and the following morning I was able, literally, to lift away the placentae. The animal continued to do well for 24 hours, when I was informed that she seemed unable to rise. An examination revealed a very much enlarged carpal joint, hot and painful. At first I thought it had been injured at the time of calving; it soon became obvious that we were dealing with an abscess. After a time the abscess burst. Never have I seen such a copious discharge of pus and it continued for days.

The owner was anxious that nothing should be left undone to effect the animal's recovery. No expense was spared. The cow lay for a month, during which time she ate with avidity and ruminated. Needless to say she was plied with that drug upon which cattle practice is founded and it is noteworthy that when not propped up, she lay out flat on the ground, but even in that position she continued to ruminate. Ultimately however, she became so emaciated and so beset with appalling bed sores that, very reluctantly, we felt obliged to send her to the kennels.

Had I been to College 30 years later no doubt I should know a word to describe the condition into which this unfortunate animal lapsed. Suffice it to say that I think the multiple pregnancy drained her of all her vitality. She appeared to be left with nothing but the will to live, but every attempt to get her to her feed ended in failure. Never at any time prior to becoming pregnant had this cow received treatment with pregnant mare's serum.

Even though the case is an extreme example of the effects of multiple pregnancy surely it points to the reason why experienced stockmen abhor the production of more than one calf at a birth. This animal could not be regarded as having suffered any harm from the actual calving, in that respect she had every chance to regain her strength.

Meantime her calves which received treatment at birth to compensate for the want of the dam's milk, none of which was available, have continued to prosper. They are now almost yearling and without exception compare favourably with calves of similar age which were born singly.

Yours faithfully,
H. BELL.

65-67 Grenfell Road,
Maidenhead,
Berks.
December 9th, 1959.

Sir,—The recent communications in THE VETERINARY RECORD regarding twin calvings has prompted me to take into consideration 22 cases of twin parturition in the bovine animal.

There are 20 cases of retained foetal membranes which called for interference within 3 days of parturition; of these there were 12 cases which needed several attempts at removal, followed by a protracted course of uterine irrigations. In 6 cases both foeti were dead at parturition, and in 2 of these cases abortion occurred at 7 to 8 months of pregnancy accompanied by a violent metritis.

In 3 cases one of each twin was born dead. In 13 cases both foeti were delivered alive, and this record is mainly due to one Friesian cow that produced 10 live calves during her last 5 parturitions.

Maternal dystocia was experienced in 4 cases mainly due to the condition of uterine inertia, and 3 cases of foetal dystocia.

Fourteen cases of physiological birth were experienced in the first and second stages of labour only, and only one case of physiological birth in all three stages of labour. This latter achievement was accomplished by a Jersey heifer, with the whole process of parturition taking only 30 minutes.

Strangely, only four of these 22 cases were of the true beef breeds, the foetal mortality being 100 per cent. and the majority of all cases mentioned being middle-aged cows in their prime.

These few cases certainly do not give a true picture of twin parturition, as undoubtedly a large number are delivered without seeking veterinary assistance, but I have a feeling these cases are in a minority.

The proportion of males to females is another interesting factor; of 18 cases, 12 were of opposite sex and 6 of the same sex.

The recent writings on twin calvings in the agricultural press is being accepted whole-heartedly by many enterprising farmers who have experience of sheep rearing, and are under the impression that the incidence of live twins in a herd are similar to that seen in a flock of sheep.

Many factors have to be taken into consideration before this new drive to increase beef production, as mentioned by Mr. Tutt, is carried out on the farm, and as suggested by Mr. Grant it would be more in line if we aimed at the prevention of twinning in cows in the light of present-day knowledge.

Yours faithfully,
K. R. WILLIAMS.

10 Preston Avenue,
Faversham,
Kent.
November 30th, 1959.

Mr. Louis Magee

Sir,—How many, I wonder, noticed the name Louis Magee (Irish International Fly-half) in *The Sunday Times* (December 6th) article on great rugby players of the past 60 years? Louis Magee was in his final year at Camden Town in 1900 and was the College hero, and a great favourite. He was a charming fellow, full of Irish wit, and between football and study led a very busy life. He was an excellent example.

After qualifying, I believe he made quite a name for himself in the old country in equine circles, but but unfortunately "The Reaper" claimed him all too soon.

It is nice to know that he is still remembered.

Yours faithfully,
WILLIAM TRIGGER.

Queen Street,
Newcastle,
Staffs.
December 7th, 1959.

Schistosomus reflexa in Chinchilla lanigera

Sir,—A case of dystocia in a chinchilla pregnant with one large foetus and after prolonged labour, necessitated caesarean section.

This was carried out under ether/oxygen inhalation anaesthesia through a mid-line incision and in the normal manner used with small domestic animals. It was found that the difficulty in parturition was caused by the fact that the foetus, which was large and very much alive, was a schistosomus reflexa, similar to that so frequently seen in bovine animals. A very small mummified foetus was also present.

More recently a young chinchilla delivered a dead male schistosomus reflexa unaided. This appeared to have died *in utero* probably 2 to 3 weeks before extrusion. Nine hours later a full term viable female schistosomus reflexa was removed with difficulty.

It has been suggested that the occurrence of schistosomus reflexa in chinchillas may be relatively high—the majority dying in the early stages of pregnancy and only being seen as small mummified foetuses.

We are indebted to Dr. Arthur of the Royal Veterinary College, for confirming the type of monstrosity, and to Miss Briggs for the interesting radiograph.

We understand from Dr. Arthur that this type of abnormality is unexpected in species other than ruminants and swine.

Yours faithfully,
D. A. PARKES.
K. G. MORGAN.
D. H. W. BROWN.

Llanover Lodge,
Welsh Street,
Chepstow, Mon.
December 7th, 1959.

V.V.B.F. Christmas Appeal

Sir,—As the great festival approaches, we should like to take this opportunity of reminding readers of the Christmas Gift Account from which it has been possible in the past to give our less fortunate brethren or their widows (some with children) a monetary gift, so that they too may have an enjoyable Christmas.

The many grateful letters of thanks we receive from recipients show how much they appreciate this help, and what it has meant to them.

We appeal to all who read this letter to support the good cause generously by sending at an early date a cheque or postal order, however small, to the Secretary, V.V.B.F., 10 Red Lion Square, London, W.C.1.

There may be some who would like to send a small Christmas parcel direct to one of the Fund's recipients. If so, a name and address will be gladly supplied.

We extend our warm thanks to those members who have supported the appeals in previous years.

Yours faithfully,
H. W. DAWES,
President.
J. McCUNN,
Hon. Treasurer.
J. J. DUNLOP.
Hon. Secretary.

10 Red Lion Square,
London, W.C.1.
December 2nd, 1959.